



Radiodiagnosis

ROLE OF MRI IN DIAGNOSIS OF RING ENHANCING LESIONS OF BRAIN

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ABSTRACT

Introduction: Multiple ring enhancing lesion are one of the most commonly encountered neuro-imaging abnormalities. CT and MRI used to detect these lesion and to distinguish infective from neoplastic lesions because a misdiagnosis can lead to unwarranted neurosurgery and exposure to toxic chemotherapy or potentially harmful brain irradiation. **Materials and Methods:** Data were analyzed in 50 patients with clinical indication of contrast enhanced MRI referred to the department of radiodiagnosis. The study was performed on 1.5 Tesla Siemens Magnetom Essenza MRI machine. **Results:** The most common age presentation is 21-30 years in males with presenting complain of seizures. Most common lesion is tuberculoma in supratentorial area of brain. **Conclusions:** Commonest infective causes of ring enhancing lesion was Tuberculoma followed by Neurocysticercosis. Metastasis was most common non infective cause of ring enhancing lesion.

KEYWORDS : ring enhancing lesion, MRI, tuberculoma, metastasis, neurocysticercosis

INTRODUCTION

Multiple ring enhancing lesion are one of the most commonly encountered neuro-imaging abnormalities. CT and MRI used to detect these lesions. A wide range of etiologies may present as multiple ring-enhancing lesions.

MRI with help of intravenously injected Gadolinium is used for evaluation of enhancement pattern of brain lesions to differentiating benign from malignant; post-operative recurrences from metastatic foci; edema from tumor foci.

Now with advancing technology, it has become extremely important to distinguish infective from neoplastic lesions because a misdiagnosis can lead to unwarranted neurosurgery and exposure to toxic chemotherapy or potentially harmful brain irradiation. For example, in case of neuro-tuberculosis vs metastasis, it is essential to differentiate between these two conditions because their management and prognoses are totally different.

AIMS AND OBJECTIVES

- To establish a diagnosis of the various ring enhancing lesions on MRI.

MATERIALS AND METHODS

- Study design:**
- All the patients with clinical indication of contrast enhanced MRI referred to the department of radiodiagnosis.
- Written informed consent was obtained and the procedure was briefly explained to the patient including the risks of contrast examination.
- The study was performed on 1.5 Tesla Siemens Magnetom Essenza MRI machine.

Inclusion criteria:

Patients presented with CNS related complains
> Seizures > Weakness > Headache > Fever > Ataxia > Vomiting

Exclusion criteria:

- Cardiac Pacemaker
- Metallic implants
- Claustrophobia
- Non co-operative patient

Technique of MRI examination:

Brain were scanned with T1WI, T2WI, STIR, DWI and GRE sequences in axial, coronal and sagittal planes with 5 mms slice thickness with and without contrast. Dosage of contrast used was 0.1 mmol/kg.

RESULTS AND OBSERVATION

Table – 1 Age Wise Distribution Pattern

Age	No. of Patients	Percentage (%)
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0-10yr	6	12
11-20yr	10	20
21-30yr	11	22
31-40yr	4	8
41-50yr	3	6
51-60yr	9	18
>60yr	7	14
Total	50	100

Table – 2 Spectrum Of Disease

Spectrum of diseases	No. of cases
Tuberculoma	24
NCC	12
Metastasis	11
Brain abscess	2
High grade glioma	1
Total	50

Sex Distribution: Out of 50 patients that were evaluated of which 29 (58%) were males and 21 (42%) were females.

Clinical Features: Seizure was the most common presenting complaint in 38.31% of cases followed by fever (25.23%), Headache (21.56%), weakness (8.4%), vomiting (4.70%), ataxia (1.8%).

Number of Lesions: Among 50 patients were evaluated – 17(36%) patients has solitary lesions. Multiple ring enhancing lesions were seen in 33(64%) patients of cases.

Location: Most common location for ring enhancing lesion was supratentorial area of brain (Parietal region 36.27% and Frontal region 26.47%) while about 7.84% lesions were located infratentorial area of brain.

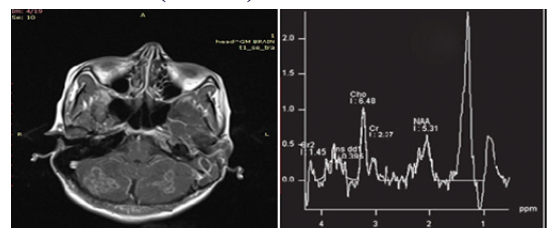
TUBERCULOMA (CASE 47)

Figure (a) Post Contrast T1 axial (b) MRS

- Multiple well defined conglomerated ring enhancing lesions involving bilateral cerebellar hemispheres. MRS shows large

lipid lactate peak.

METASTASIS (CASE 19)

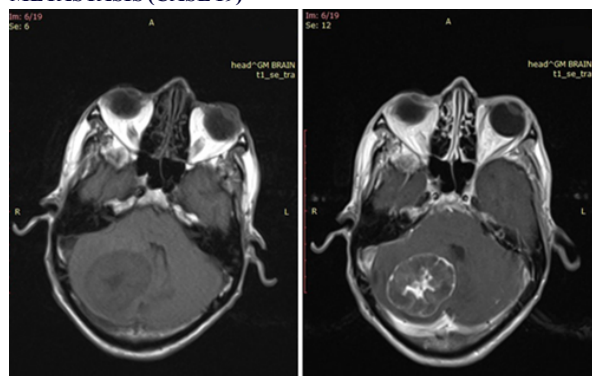


Figure (a & b) T1 axial and post contrast T1 axial images

- Well-defined thick-walled ring enhancing lesion are seen in right cerebellar hemisphere. MRS study shows choline peak.

NEUROCYSTICERCOSIS (CASE 1)

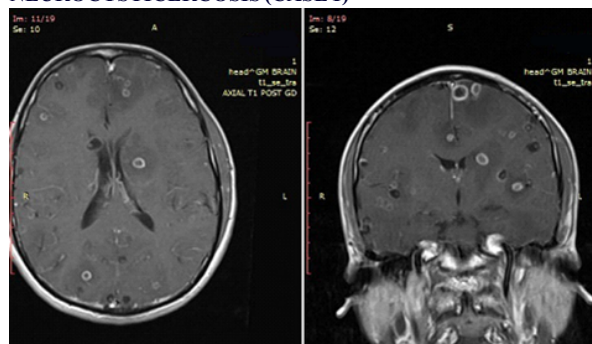


Figure (a) axial and (b) coronal contrast enhanced T1W images

- Multiple well defined ring enhancing lesions involving both cerebral hemispheres

DISCUSSION

A various cause of ring enhancing lesions were found in present study group (n=50) ranging from infective to neoplastic etiology.

Age group: Distribution ranged from 4 years to 77 years. The maximum lesions were seen at 21-30 age groups accounting for 22 % of cases and least was seen in age group of 41- 50 years which was 6%.

Sex Distribution: Out of 50 patients that were evaluated of which 29 (58%) were males and 21 (42%) were females.

Clinical Features: Seizure was the most common presenting complaint in 38.31% of cases followed by fever (25.23%), Headache (21.56%), weakness (8.4%), vomiting (4.70%), ataxia (1.8%).

Number of Lesions: Among 50 patients were evaluated – 17(36%) patients has solitary lesions. Multiple ring enhancing lesions were seen in 33(64%) patients of cases.

Location: Most common location for ring enhancing lesion was supratentorial area of brain (Parietal region 36.27% and Frontal region 26.47%) while about 7.84% lesions were located infratentorial area of brain.

Spectrum of Diseases: Most common ring enhancing lesion encountered was tuberculoma (48.0%) followed by NCC (24.0%), metastasis (22.0%), Brain abscess (4%), High grade glioma (2%).

Tuberculoma:

Tuberculosis is the commonest pathology in our study, followed by neurocysticercosis.

In my study commonest age group of patients was 21-30 years (33%),

presenting complaint fever (39%) and location for tuberculoma was frontal - parietal region (62%). As compared to study conducted by *Ps mahato et al⁽²⁾*, commonest age group were 31-40 years, presenting complain headache (66%) and location for tuberculoma was frontal - parietal region (67%).

Table – 3 Number, size and characteristic features wise distribution of tuberculoma

		Present study(n=50)	Wasay M et al ⁽²⁾ (n=100)	GunerSonmez a et al ⁽³⁾ (n=27)
Number	Solitary	54 %	31 %	11 %
	Multiple	46 %	69 %	89 %
Size	<2 cm	64 %	-	90 %
	>2 cm	36 %	-	10 %
Characteristic	Ring	96 %	98 %	86 %
	Target	4 %	2 %	14 %

In my study, solitary tuberculoma lesions(54%) were more common compared to multiple lesion(44%). As compared to study by *Wasay M et al⁽²⁾*, *GunerSonmeza et al⁽³⁾* shows multiple lesions were more common than solitary lesions.

Neurocysticercosis:

NCC was 2nd most common cause of ring enhancing lesion in our study. In my study, seizure (42%) were the commonest presenting complaint as compared to study by *Ps mahato et al⁽¹⁾* all patients had history of seizures.

In my study, all lesions in NCC were present in brain parenchyma. No lesions was found in intraventricular location. Similar to other studies like *Martinez et al⁽⁶⁾* reported 53% and *Amaral L et al⁽⁷⁾* reported 55% lesions in brain parenchyma.

In our study, among 12 cases with NCC, all cases had multiple lesion. All cases were less than < 2cms, agreement with other studies by *Teitelbaum GP et al⁽⁴⁾*

Central scolex were seen only 2 cases out of 12 cases of NCC appearing iso to hypointense on T2 weighted / FLAIR images within hyperintense cyst and iso to hyperintense on T1 weighted images within hypointense cyst (probably representing colloidal - vesicular stage of NCC). Similar to *Teitelbaum GP et al⁽⁴⁾* had 6 cases out of 12 parenchymal lesions that have central scolex.

Metastasis:

Metastasis was commonest non infectious cause of ring enhancing lesion in our study. Lung carcinoma was commonest cause for metastasis followed by breast carcinoma, in agreement with the study by *Nussbaum ES et al⁽⁷⁾*

Patients with Metastasis, most lesions were predominately present in Parietal region (36%), frontal region (20%) – supratentorial location while about 14% lesions were in infratentorial location.

In my study, all cases of metastasis had multiple (>4 number) lesions. On contrary study by *Delattre JY⁽⁶⁾* with metastasis 49% had solitary metastasis lesion.

In patients with metastasis, all 11 patients had lesions > 2cm. No lesion found <2 cm in size.

Abscess:

In our study of 50 patients, 2 patients were encountered with brain abscess. Brain abscess showed marked restriction appearing hyperintense on DWI images with correspondingly hypointense on ADC map. This in agreement with study by *Kim et al⁽⁹⁾*

In our study, Abscess wall appeared hypointense on T2 weighted images and iso to hyperintense on T1 weighted images in agreement with study by *G. Luthra et al.⁽¹⁰⁾*

High grade glioma:

In our study of 50 ring enhancing patients, only 1 patient was observed with high grade glioma. Lesion showed complete thick ring enhancement. No diffusion restriction on DWI images was noted.

CONCLUSION

- The incidence of Ring enhancing lesions was found more common

in of 21-30 years of age group.

- Seizure was the commonest presenting complain followed by Fever.
- Commonest infective causes of ring enhancing lesion was Tuberculoma followed by Neurocysticercosis.
- Metastasis was most common non infective cause of ring enhancing lesion.
- Marked diffusion restriction was noted among brain abscess differentiating it from other pathologies.

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